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MARKET OPPORTUNITIES FOR TREATED WOODEN GUARDRAIL POSTS IN WEST VIRGINIA

At present practically no wooden guardrail posts are being installed along West Virginia's highways. Neither are concrete posts. Only steel posts are being used in new highway construction despite the fact that wooden posts that have been properly treated with a decay-preventing preservative are entirely acceptable to the State Highway Department. Furthermore, treated wooden posts are reported to provide as good or better service than posts made of steel or concrete (1, 2, 3).

West Virginia State Road Commission officials say that, up to the construction year 1946, wooden posts of naturally decay-resistant species (primarily black locust) were used almost exclusively for new highway construction in the State. But between 1946 and 1958 decay-resistant wooden posts became scarce and were gradually replaced by concrete guardrail posts in new construction. Steel guardrail posts were not used in West Virginia until 1958. Since then steel has been used almost exclusively in the State, despite the Highway Department's eventual acceptance of treated wooden posts in 1960.[1]

The Study

Concerned over this loss of a market for wooden posts, the Forest Products Marketing Laboratory of the U.S. Forest Service has made a study to determine why wooden guardrail posts are not being used in the State. Approximately 28,000 posts are installed in the State per year.

[1] A number of species and treatments are acceptable for treated wooden posts, most commonly creosote or osmasalt treated southern yellow pine.

Designs for each State road project specify the type of guardrail to be installed. There is no choice here. However, in most cases, the contractor bidding for the project may choose and prepare his bid for either treated wood, primed steel, galvanized steel, or concrete guardrail posts to support this guardrail. Since the contractor chooses the type of post to be installed, it is apparent that he is primarily responsible for the fact that wood is no longer used for guardrail posts in West Virginia.

Since road-construction contracts are awarded on the basis of competitive sealed bids, the contractor must consider the comparative in-place costs of the four types of guardrail posts in making his choice. The study was designed in part to determine these costs.

Initial investigations determined that guardrail erection in West Virginia is generally subcontracted to one of four firms in the State who have the necessary equipment and experience to handle this type of work. Two of the firms are located in West Virginia; the other two are in neighboring states. Officials of each of these firms were personally interviewed in the spring of 1964 to determine their comparative in-place costs for the four types of guardrail posts as well as other factors affecting their choice of posts.

Results

The four firms interviewed accounted for virtually all of the guardrail erection contracted for by West Virginia in 1963. The work is usually contracted a year in advance, meaning that projects let in 1963 are accomplished during 1964. With the exception of one small job, all of the contractors bid steel guardrail posts. About 40 percent of the posts used in 1963 were primed steel and 60 percent were galvanized steel.

Contractors said that treated wood and concrete guardrail posts are generally set in the same manner. The procedure is as follows: a crew first lays out the posts at specified intervals along the installation site, a truck-mounted auger then drills the holes, the post is set in the hole, and the hole is backfilled with hand shovels and then tamped either by hand or machine. One contractor installs the wooden posts first and then slopes the top and drills for the rail, but wooden posts are usually purchased pre-drilled and sloped. All concrete posts are purchased pre-drilled and sloped.

A setting crew for wooden or concrete posts usually consists of seven or eight men. When unfinished wooden posts are used, an additional man is required to slope the tops, drill holes for the guardrail bolts, and treat these holes with a preservative. Three contractors indicated that

Table 1.—Comparative costs of treated wood, primed steel, galvanized steel, and concrete guardrail posts in West Virginia, 1964

(In dollars per post)

Item	Treated wood[1]		Primed steel[2]		Galvanized steel[3]		Concrete[4]	
	Average	Range	Average	Range	Average	Range	Average	Range
Purchase price[5]	2.50	2.50	4.84	4.75-5.00	5.68	5.25-5.85	3.75	3.25-4.50
Butt treating	—	—	.13	.09- .20	—	—	—	—
Painting	—	—	.12	.05- .20	—	—	—	—
Sloping & drilling	.26	.25- .29	—	—	—	—	—	—
Setting	2.03	1.87-2.35	.45	.35- .52	.45	.35- .52	2.03	1.87-2.35
Total	4.79	4.62-5.13	5.54	5.24-5.72	6.13	5.74-6.32	5.78	5.12-6.39

[1] Post dimensions: 7 inches at small end, length 6 feet. Treatment: 8 pounds per cubic feet creosote oil or .55 pounds retention dry cromated zinc chloride, pentachlorophenol, or osmosalt chemical.

[2] 8½ pounds per lineal foot.

[3] Weight of galvanizing—2 ounces per square foot.

[4] Reinforced and precast in accordance with designs.

[5] Delivered to the installation site.

a crew of this size generally sets 80 wooden or concrete posts per 8-hour day; one contractor said 100 posts per day.

In contrast, both primed and galvanized steel posts are nearly always set with a truck-mounted driver. Prior to driving, primed steel posts are butt-treated with an asphalt paint. The primed steel posts also require two coats of white paint after setting. Galvanized steel posts require no treatment or painting before or after erection.

A setting crew for steel posts generally consists of five or six men. A crew of this size usually sets about 240 steel posts per day. One contractor said that his daily production averages nearly 290 posts.

To summarize, it is apparent from the size of crew required and daily production rate that wooden and concrete posts cost considerably more to install than steel posts. Based on average crew wages and daily production, the average installation cost is $2.03 for a wooden or concrete post, but only 45c for a galvanized steel post and 70c for a primed steel post.

However, the initial cost of a treated wooden post is considerably less than for either of the other three types. And, despite higher setting costs, the total in-place cost of a treated wooden guardrail post is still approximately 75c to $1.34 less than the in-place cost of a primed steel, galvanized steel, or concrete guardrail post (table 1).

It should be noted that there were other cost factors that were not measured. Equipment costs as well as the rate at which the guardrail can be hung were considered equal for all four types of post. The contractors indicated that this assumption is generally true and were unable to provide meaningful cost differentials among the four types of post. Thus, the absolute costs reported in table 1 may vary but the relative cost relationships should hold true.

Discussion

It is apparent that the in-place cost of treated wood guardrail posts is considerably less than the in-place cost of any of the other three types of guardrail posts. Then why are all of the contractors using steel posts, not wood?

In answer to this question, all contractors stated that their choice of post is governed mainly by production considerations. Guardrail installation normally represents but a small portion of the total cost of the road project. The cost of installing guardrail posts is a less important consideration than integrating the installation job with the other necessary jobs in building a highway.

Guardrail erection is normally the last operation on a road project.

It is usually August before the guardrail subcontractor can begin erection work. And this work must be completed before inclement weather begins in November. Because of the greater time required to install wooden posts — and the increasing uncertainties involved, such as possible default of contract — the contractors apparently choose the type of post that can be installed most quickly in this short erection season.

Since speed of installation is the contractors' primary reason for using steel posts, efforts should be directed at improving setting techniques and increasing the number of wooden posts that can be set per day. None of the contractors have tried driving wooden posts. Perhaps at least some of the installations with more favorable driving conditions would permit driving wooden posts and a corresponding daily production increase. Although it is highly unlikely that the driving of wooden posts will ever equal the daily installation of steel posts, the elimination of one or two men from the setting crew could bring the comparative setting costs more in line.

There are other possibilities that should be investigated. Perhaps setting crews could be reorganized or enlarged. Or perhaps the use of additional crews or equipment is feasible to eliminate bottlenecks and speed up production.

Some contractors mentioned alignment difficulties with each of the different types of posts. Perhaps this problem could be alleviated by drilling the holes for the guardrail bolts and sloping the tops after the posts have been set. At this point, it should be noted that many technologists question the need for sloping well-treated wooden posts, at least in regard to durability. In addition to permitting an easier alignment of holes, this system would permit the post to be topped at the proper height in instances when the post could not be set to the desired depth. Wooden posts are clearly better suited than steel or concrete for field modifications of this type.

Finally, any extension of the guardrail-erection season should favor the use of wooden posts. The contractors indicated that they usually have slack periods during the spring and summer months and must schedule their operations as dictated by the prime contractor. If the guardrail subcontractor were given additional time to complete installations, his concern could switch to lower cost installations. And, for any one guardrail installation project, the use of treated wooden posts should result in lower costs. To accomplish this extension of contract time, closer cooperation between the prime contractor and the guardrail subcontractor is apparently needed.

These are some of the factors that could have a significant effect on the use of wooden guardrail posts in West Virginia. Additional research, perhaps even field tests and demonstrations, is needed to determine the feasibility of these various alternatives.

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